

Application No. 09/682,496
Amendment dated September 9, 2003
Reply to Office Action of June 12, 2003

Amendments to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

1. (Currently amended) A method for taking up play in a drive system when a change in load occurs, the method comprising the steps of:

coupling a drive engine to a drive line in a vehicle,

acting on the drive engine and/or the drive line with a driving or braking torque by an electric motor, wherein the motor is coupled to the drive engine or constitutes a part of the drive line; and

controlling the electric motor by a control system, wherein the control system sends a pulse to the electric motor when a change in load occurs, thereby prompting a exactly one torque pulse from the electric motor to take up play in the drive line before torque from the drive engine occurs.

2. (Original) The method according to claim 1 further comprising the step of measuring torque applied to the drive line in current operating conditions.

3. (Re-presented - formerly independent claim 1 and dependent claim 2) ~~The method according to Claim 2 further comprising~~ A method for taking up play in a drive system when a change in load occurs, the method comprising the steps of:

coupling a drive engine to a drive line in a vehicle,

acting on the drive engine and/or the drive line with a driving or braking torque by an electric motor, wherein the motor is coupled to the drive engine or constitutes a part of the drive line;

controlling the electric motor by a control system, wherein the control system sends a pulse to the electric motor when a change in load occurs, thereby prompting a torque pulse from the electric motor to take up play in the drive line before torque from the drive engine occurs, and

measuring torque applied to the drive line in current operating conditions;

selecting the height and/or duration of the pulse from a matrix in a memory based on the torque applied.

4. (Original) The method according to claim 3 further comprising the step of measuring the degree to which the torque pulse takes up the play in the drive line.

5. (Original) The method according to claim 4 further comprising the step of correcting the size of the pulse for the current operating conditions in said matrix on the basis of how the torque pulse from the electric motor has taken up the play.

6. (Original) The method according to claim 1 further comprising the step of sending the pulse when the change in load in the drive line goes from negative (M_p) to positive (M_c) torque.

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7. (Currently amended) A drive system for implementing the method according to Claim 1, the drive system comprising:

a drive engine coupled to a drive line in a vehicle,

an electric motor able to act on the drive engine and/or the drive line with a driving or braking torque, and

a control system for controlling the electric motor, wherein the control system, wherein the control system is arranged so as to send a short pulse to the electric motor when a change in load occurs, and wherein the electric motor generates a exactly one torque pulse for the purpose of taking up play in the drive line before torque from the drive engine occurs.

8. (Original) The method according to claim 7 wherein the electric motor is further comprised of an integrated starter motor and generator.

9. (Re-presented - formerly independent claim 7 and dependent claim 8) ~~The drive system according to Claim 7~~ A drive system for implementing the method according to Claim 1, the drive system comprising:

a drive engine coupled to a drive line in a vehicle,

an electric motor comprised of an integrated started motor and generator and able to act on the drive engine and/or the drive line with a driving or braking torque, and

a control system for controlling the electric motor, wherein the control system, wherein the control system is arranged so as to send a short pulse to the electric motor when a change in load occurs, and wherein the electric motor generates a torque pulse for the purpose of taking up play in the drive line before torque from the drive engine occurs, wherein the control system is further comprised of a matrix stored in a memory, wherein the size and duration of the pulse are linked to different operating conditions.

10. (Original) The drive system according to claim 9 wherein the drive line is further comprised of at least one sensor for measuring the effect of the torque pulse on the play in the drive line.

11. (Original) The drive system according to claim 10 wherein the control system is arranged so as to correct the size of the pulse in the matrix in the light of measured values from said sensors.

12. (Original) The drive system according to claim 7 wherein the change in load occurs when the drive engine changes from engine braking to driving.

13. (Original) The drive system according to claim 7 wherein the drive engine is an internal combustion engine.

14. (Original) The drive system according to claim 7 wherein the electric motor is coupled to the drive engine.

15. (Original) The drive system according to claim 7 wherein the electric motor constitutes a part of the drive line.

16. (Currently amended) A drive system arrangement for taking up play in a drive line when a change in load occurs in the drive system, the drive system arrangement comprising:

a drive engine coupled to a drive line in a vehicle,

an electric motor able to act on the drive engine and/or the drive line with a driving or braking torque, and

a control system for controlling the electric motor and arranged so as to send a short pulse to the electric motor when a change in load occurs,

wherein the electric motor generates a exactly one torque pulse for the purpose of taking up play in the drive line before torque from the drive engine occurs.

17. (Original) The drive system arrangement according to claim 16 wherein the drive engine is an internal combustion engine.

18. (Original) The drive system arrangement according to claim 16 wherein the electric motor is coupled to the drive engine.

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19. (Original) The drive system arrangement according to claim 16 wherein the electric motor constitutes a part of the drive line.

20. (Re-presented - formerly independent claim 16) ~~The drive system arrangement according to Claim 16~~ A drive system arrangement for taking up play in a drive line when a change in load occurs in the drive system, the drive system arrangement comprising:

a drive engine coupled to a drive line in a vehicle,

an electric motor able to act on the drive engine and/or the drive line with a driving or braking torque, and

a control system for controlling the electric motor and arranged so as to send a short pulse to the electric motor when a change in load occur, wherein the control system is further comprised of a matrix stored in a memory, wherein the size and duration of the pulse are linked to different operating conditions,

wherein the electric motor generates a torque pulse for the purpose of taking up play in the drive line before torque from the drive engine occurs.

21. (Original) The drive system arrangement according to claim 20 wherein the drive line is further comprised of at least one sensor for measuring the effect of the torque pulse on the play in the drive line.

22. (Original) The drive system arrangement according to claim 21 wherein the control system is arranged so as to correct the size of the pulse in the matrix in the light of measured values from said sensors.

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23. (Original) The drive system arrangement according to claim 16 wherein the change in load occurs when the drive engine changes from engine braking to driving.